

DRAGON USER

International edition

The independent Dragon magazine

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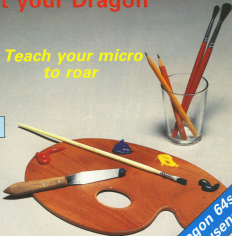
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*Teach your micro
to roar*

Battleships

The Forth Protocol

WIN 4 Dragon 64s
from CompuSense



DRAGON USER



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How to submit articles

The quality of the material we can publish in
Dragon User each month will, to a very great
extent, depend on the quality of the
contributions that you can make with your
Dragon. The Dragon computer was launched
on to the market with a powerful version of
Basic, but with very poor documentation.

Articles which are submitted to Dragon
User for publication should not be more than
3000 words long. All submissions should be
typed. Please send into Dragon User in
double space (leave one line). Programs
should, wherever possible, be computer
printed on plain white paper and be accom-
panied by a tape of the program.

We cannot guarantee to return every
submitted article or program, so please keep a
copy. If you want to have your program
returned you must include a stamped,
addressed envelope.

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Editorial

HOW ARE THE mighty fallen! Acorn, once the darling of the United
Securities Market, has been forced to restructure itself with financial aid
from Italian giant Olivetti. Commodore UK has halved the price of its new
Plus4 mini and parted company with its general manager Howard
Stanworth. Even Sinclair has cut back on production and postponed the
US launch of the QL.

Nor is this phenomenon confined to the UK. Sand, once described as
the "Japanese Apple", has been in discussions with Toshiba about
possible investment. This follows a sharp drop in profits last year and a
reduction in market share to little more than four per cent.

The micro market can fairly be described as "littery" at the moment. The
boom years of 1980-83 are over and no one is quite sure how big the
market will be in future. This, in turn, has had a knock-on effect among
book and software publishers.

Dragon users, of course, are quite familiar with this situation having
experienced the troubles associated with Dragon Data's demise. Thus,
they are well placed to advise their fellow micro owners that all is not
"doom and gloom". Any machine which establishes a large user base will
continue to be served by software and peripherals for some time, even if
the manufacturer ceases to exist.

Hopefully, once excess production capacity has been shed, the market
will settle down again. The question occupying most peoples' minds at
the moment is just how much capacity is excess — no one is taking any
bets on the answer.

If you're into program writing...

Get this into an envelope

If the programs you are writing involve sophisticated graphics, you have two choices, a severe headache or Touchmaster.

Obviously you'll want to consider the latter, so in the mean time send away for your free Touchmaster literature and find out more about the best value/performance graphics tablet available... or take two pain killers!

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computer

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Add 8 Commodore 64 owners, eat your hearts. ... this has got to be the best Grand Prix game ever. Full action, super smooth scrolling "on-rp" graphics, and loads of extras, such as: ... 4 circuits to choose from, a tyre change if they burn their tyres out too quickly, plus a set number of cars to pass in order to qualify. Its fast and very very good.

1 Joystick required

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Post & Packing 50p

Tape £8.00

NEW FROM MICRODEAL
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16K

ATHLETIX

Here's the one everybody with a Dragon or Tandy has been waiting for. A track and field game for 1 or 2 athletes with great graphics and 8 arm wrenching incredibly long events.

1 Joystick required

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16K

Cuthbert in the Cooler

Cuthbert's been spotted back in time to World War 2, and while wars, into a prisoner of war camp. So our elusive hero has to escape. Firstly, he must try and grab the keys from the drunken guards, and make a dash for the main doors. Then he must find some "papers" and leg it through the mine field, then the fern and ... much much more. 100% machine-code ... 16K Res.

Graphics. 1 Joystick required

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A truly superb three-dimensional graphics type arcade adventure where you must save the crystals from the mischievous minnows. An original concept in graphics, where you can travel through the tunnels and use the lifts between floors.

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Completely Menu controlled. Audible Alert if wrong information entered. Draw Strings automatically recognised for quick reference. Change PHONICS at the touch of a key. Simple cursor movement by means of an air key. Full UPPER & LOWER CASE. Large and small Rubber. User Define keys plus SIX OTHER USEFUL FUNCTIONS.

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6809 Show

THE SECOND 6809 Colour Show for Dragon and Tandy users will be held at London's Royal Horticultural Halls on March 30 and 31. Exhibitors will include Tandy, Microdeal, Compusense, Design Design, Glazy and Velmec.

A new monitor for the Dragon will be launched by Dealer Deals. The Demon monitor can handle baud rates from 300 to 1200 and will cost around £20. The price of the accompanying software has not yet been fixed.

Dragon User will be exhibit-

ing on stand No 45-46. There will be a wide selection of current and back issues of the magazine on display, together with a number of Dragon books from Sonshine, all for sale to the public.

Admission to the show, which will be open from 10 am to 6 pm, will cost £2 for adults and £1 for children under 12. Further information is available from the show organisers, Computer Marketplace (Exhibitions) Ltd, 25 Orange Street, London (Tel: 01-930 9512).



Last November's 6809 Show — busy as ever

Jet Set Dragon

IF YOU have ever tried to climb the Bangor Tree, get under the Security Guard or perform a Quickdive, then the chances are that you have played Jet Set Willy on a Spectrum. Now, Software Projects is launching Jet Set Willy on the Dragon.

Jet Set Willy is the sequel to Mario Bros and again features the adventures of Minor Willy. The game is set in Willy's mansion and there are some 60 locations to explore, each with their own hazards and hidden surprises. Watch out for guards on the battlements and the entrance to Hades.

Matthew Smith's ego, which was converted to the Dragon by Roy Collins, costs £7.95 and is available from Software Projects, Alton Road, Woolton, Liverpool L25 7SP.

Dragon roars

A SPEECH synthesiser for the Dragon is being released by J Morrison (Miles).

The Speechless synthesiser plugs into the printer port, and is powered from the mains. It has a built-in speaker, and will come with two software packages to demonstrate its capabilities.

The package will cost £24.95 from J Morrison (Miles), Dept DU085, 4 Rein Gardens, Taglag, West Yorkshire, WF3 1UR.



Compusense imports Dragon 64s

EUROCARD has appointed London based Compusense as its UK Dragon distributor. Compusense is now shipping Dragon 64s and Dragon disk drives for sale in the UK. Single disk drives will cost around £240 and double disk drives about £310. The price of the Dragon 64 has been fixed at around £195. All

prices inclusive of delivery.

Both the Dragon 64 and the disk drives will be on sale at the Compusense stand at the 6809 show on March 30 and 31 at London's Royal Horticultural Halls.

More information from Compusense, Box 166, 2960 Queen Lanes, Palmers Green, London N13 5SA.

New releases

BLAST! Computer games will be showing four new releases at the 6809 Show.

Copier Snatch, based on Scramble, Star Wars, a version of Galaxian, and Star Defence, a Defender type game, are all £1.99.

The fourth game, Albert, is a version of G-Bert, and will cost £3.99.

John Bailey, the company's managing director, says that a video display will be running full-time at the show to allow customers to take a look at the programs before buying.

A copy of the demo video has also been sent to Judo Avenue of Birmingham.

Screaming Abdabs

LANCASHIRE BASED A&F Software has just released a new program for the Dragon — Screaming Abdabs. There are 26 complex screens, with various monsters, slides, collapsing floors and other hazards to prevent you from reaching your goal.

Each screen contains a key which is necessary to access the next level.

The game, which costs £8.90, is available from A&F Software, Unit 8, Caniside Industrial Estate, Woodside Street East, Horsham, Lancashire OL16 5UR.



Mysterious

THE Mysterious Adventure series originally released by Channel 8, will now be put out by Adventure International, publishers of the Scott Adams' range of adventures.

This follows the announcement that Brian Howarth, author of the Mysterious Adventures, has joined AI to head the programming team.

He will be working on Dragon conversions of the entire AI range — Spideeman will be next, followed by a Gremmie game.

The Mysterious Adventure games are £7.95.

Mastertronic

MASTERTRONIC is converting its successful one armed bandit simulation, Fagar Jackpot, for the Dragon. It will be in the budget range, at £1.99, and will appear towards the end of March.

Incentive Confuzion

THE NEXT Dragon program from Incentive Software will be a version of the arcade game Confuzion £6.95.

Ian Andrew, Incentive's managing director, says that Confuzion will be converted as soon as the programmer has finished the Karl Trilogy.

For more details, contact Incentive Software, 54 London Street, Reading RG1 4BQ.

COLOSSAL CAVE ADVENTURE

The original classic adventure game for Dragon 64 with disk drive only £9.95

FLEX

For DRAGON or DELTA disk systems with Editor and Assembler £26.25 special price with DBASIC £39.99 available and easy to use operating system. It is the ideal operating system for the DRAGON — especially when combined with your DBASIC package. Requires DRAGON with 64K RAM.

- 48K Bytes FREE USER RAM
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- Includes over 30 standard utilities.
- Powerful Macro Assembler
- Versatile Text Editor

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- Standard 32K DRAGON BASIC
- 32 by 18 Screen and 51 by 24 Screen
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- ERROR command shows you exactly where BASIC detected an error
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- Runs under DRAGON FLEX with 51 by 24 character screen
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- HELP Facility
- 18 Digit arithmetic
- Mathematical, Scientific, Trigonometric, Statistical and Business Functions built in
- Windows
- Plot Graphs
- Print all or part of spreadsheet
- Save/Load Spreadsheet on disk
- Delete Move Replicate Row/Column
- Execute FLEX commands
- Horizontal and Vertical Ties
- Sort

Data saved to loaded from disk by DYNACALC may be passed to created by other FLEX programs, eg RMS, BASIC, PASCAL, COBOL, text editor

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DRAGON FLEX disk £19.95

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DYNAMISER OPTIMIZES YOUR
BASIC PROGRAM BY

- 1) removing redundant space and characters
- 2) deleting unnecessary REMs
- 3) combining several lines into one line

DASM/DEMON

As featured in 'DRAGON MACHINE CODE' by Ian Sinclair. An easy to use 6800 assembler (DASM) with a powerful machine code monitor (DEMON). Ideal for beginners and experienced programmers. All you need to write and debug machine code routines.

DASM DEMON cartridge £36.95
disk £19.95
DASM only cartridge £19.95
DEMON only cartridge £19.95

EDIT +

EDIT+ is a Full Screen Editor and Programmer's Tool Kit. It's an excellent aid for writing programs in BASIC and is easy to use for the novice as well as the experienced programmer. EDIT+ includes all the facilities of HI-RES. Up to 23 lines of your program are displayed on the screen and can be changed by overtyping, inserting, or deleting characters. Functions include: Find String, Change String, Copy Text, Goto Specified Line, Scroll up/Down, Append From Tape and Enter Basic Command. No Dragon is complete without an EDIT+.

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Dragon DOS disk £24.00
Dragon FLEX Disk £19.95

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Artist

Brian Hinson explains how to turn your keyboard into an artist's palette

ARTIST is a program for all the family to enjoy! You can just doodle away to your heart's content, or you can use the save and load features to create screens for games and illustrations, using all the bright colours from your Dragon.

The program starts by clearing all the Dragon's high resolution screens. It continues by asking questions to set up the Pencil, Screen, Start page and Colours you want to use. The colours you choose for your background and pen must be from those available in the Pencil you have set, (refer to page 80 of the manual). Joystick or keyboard control is included. Keyboard control is easier to use for fine control but, joysticks are better for speed. Try experimenting for yourself.

You should now have a small flashing dot that you can move around the screen. Press 'C' for control, and the computer will 'sleep' whilst waiting for a command. Now press 'I' for ink, and the dot will leave a line of your pen colour. To change colour press 'C', followed by the code number for the colour you want, (eg. 4 = red in Pencil 3).

If you want a line of a difficult angle, or to join two points you need to enter 'Box' mode. Position the dot at one end of the line and press 'C' — 'B'. Dragon will remember this point. When you are ready, position the dot at the other end of the line

required and press 'C' — 'B' — 'I', and your line will appear.

Box mode is also used to draw squares and rectangles. First register the starting point as before, then move to the diagonally-opposite corner and press 'C' — 'B' — 'B'. Hey presto! a box. Make sure you have not left a hole at the corner and you can paint it. Move your dot inside and press 'C' — 'P' — followed by the number code for the paint you want, (eg. 2 = Yellow). Box mode is also used to pick up some part of your pictures. However big, and PUT is essential. As before register the diagonal corners, 'C' — 'B', then 'C' — 'B' — 'C' and the box will be remembered in array 'P'. (see line 90).

Did you know that you only need 1/32nd of the memory reserve the Dragon manual says you need for GET and PUT routines on pages 130-11? You don't need to worry about this to use 'Artist', but for use elsewhere remember your array size need only be 1/32 length multiplied by 'Y' length divided by 32 and rounded up to a whole number. For example, the whole screen in Pencil 3 is $255 \times 191 = 48705$, divide by 32 to get 1522.03. So you could DIMension an array (F 1522) to pick up a whole screen's worth!

Having GET your detail, move the dot to the top left corner of the position you want to PUT it in and press 'C' — 'B' the detail

appears. If you need another copy of the same detail you only need to PUT it with another 'C' — 'B' and the array will continue to hold the same detail until the next time you use 'C' — 'B' — 'C'.

To draw a circle, or ring, press 'C' — 'R' followed by the radius you want. As the control routine uses keyboard input direct I have used the AGO (I) value of the key pressed, less 48, so you can have a circle of radius from 1 to 255, (ie 1 to 19).

Made a mistake? Use 'C' — 'B' to obtain an eraser, and rub it out! Finished or want a rest? Press 'C' — 'X' and you will enter the save routine. You will now be offered a choice of tape or print dumps. The tape dump is supplied in listing 1, but you will have to add your own printer dump as a subroutine from line 1770 if you want this refinement.

To recall your picture for use in another program, include a line CLOMM "picture", and record the picture just after the program on the tape. Now your picture will auto load, probably much quicker than it could be drawn in Basic, and using less memory.

When you have become proficient at drawing you may wish to use the 'Perspective' routine to create three dimensional pictures. First, decide on the vanishing point, position the dot and press 'start'. A target will appear and Dragon will remember its position even if you rub it out. From now on any time you want a line of perspective press 'start'. You will have to rub out the parts of the lines you don't want and things can get a little confusing, but the results are superb! If you are really advanced you can have two or more vanishing points by saving the part finished picture on tape, 'breaking' the program, 'run' and reload the picture and establish a new vanishing point. Have fun!

***** START OF THE ARTIST PROGRAM *****

```

10 *****ARTIST*****
20
30 ***** PENCIL PROGRAM START *****
40 ***** THE FAMILY TO USE *****
50
60 ***** BY Brian Hinson 1984 *****
70
80 ***** ALSO PLEASE READ P 80 OF *****
90
100 CLEAR: ALSO PLEASE READ P 80 OF
110 PENCIL: I: PENCIL: PENCIL: PENCIL: PENCIL:
120 OLD: PENCIL: DO YOU REQUIRE INSTRUCTIONS?
130 PRINT "I" IF
140 IF NOT (IN: OTHER: (IN: (IN: (IN: (IN:
150 (IN: (IN: (IN: (IN: (IN:
160 (IN: (IN:
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310 (IN: (IN: (IN: (IN: (IN: (IN: (IN: (IN: (IN:
    FROM: COLOURS: AVAILABLE: "I"

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320 PENCIL: DO
330 PENCIL: DO
340 PENCIL: DO: "I: PENCIL: DO: PENCIL: DO:
350 PENCIL: DO: PENCIL: DO: PENCIL: DO:
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```



```

530 IF PG=15 THENGOSUB 1100:REM A RANDOM NUMBER HAS OCCURED
535 IF ZD=4 THEN 550
540 REM GIVE THE COMPUTER HIS SHOT
550 G=INT(100)
560 PRINT"THE COMPUTER HAS SELECTED POINT "+G+"AS IT'S TARGET" FOR NR=1 TO 200-N
    GOTO 100
570 REM BRANCH TO SOUND OF MISSILE SECTION
580 GOSUB500
590 REM CHECK TO SEE IF COMPUTER HAS SCORED A HIT,IF IT HAS THEN SET VARIABLE STO
600 POS, POSITION OF SHIP TO ZERO,AND GAF TO SCORE COUNTER AND BRANCH TO HIT SECTION
610 IF G=6 THENNR=G-ZD+1:GOSUB700
620 IF G=7 THENG=ZD+1:GOSUB700
630 IF G=8 THENG=ZD+1:GOSUB700
640 REM IF THE PLAYER HAS LOST THEN TELL HIM SO.
650 IFZD=4 THENNR
660 BRANCH TO INPUT OF PLAYERS SHOT SECTION
670 G=INT(100)
680 REM SOUND OF MISSILE
690 FOR I=150 TO120 STEP -1
700 SOUND-1
710 NEXTV
720 RETURN
730 GOSUB500
740 REM SOUND OF HIT
750 PLAY"1100"
760 FOR G=1 TO 30
770 PLAY"04V35AC"
780 NEXTG
790 CLS
800 REM A HIT HAS BEEN MADE.
810 PRINTPGO,"= HIT"-FOR NR=1 TO 400-NEXT SR-FOR NR=1 TO4-PLAY"700,020DFG800C
02DFG80402DFG8" NEXT NR
820 RETURN
830 REM SOMEBODY HAS WON
840 PRINT"YOU BERT THE COMPUTER!!"-GOTO500
850 PRINT"PLAYER1,ALL YOUR SHIPS ARE LOST!HA,HA THE COMPUTER IS THE WINNER"-GOTO
500
860 PLAY"021GCT40R-R-P4T18GCT2R-CPE-L20P6L59AG4L7GFCG+FR+P6LAG-CPE-"
870 INPUT"WOETHER GO? 110-IF110<" THENPRINT"CHICKEN" END ELSE RUN -
880 REM DRAW BOAT WHICH IS TO BE HIT BY MISSILE
890 PROC@SCREEN(1):PCL
900 DRAW@RMS,80,PR,87R,CWPS,800100L15001500L100L800800R900L900R900L90012040R
910 (H)40L200400L80L204L2020402010004L20"
920 DRAW@RMS,80L8000R80L8000R800R100100L80L80L80L80L8013"
930 DRAW@H122,70,8204L204,8000,70,040204L2,8000,800000"
940 REM PUT PARTS OF SHIP WITH COLOR
950 PRINT110,20,1,1
960 PRINT134,20,1,1
970 DRAW@H10,100,L307027000000"
980 REM STONE TORPEDO AND BLANK SCREEN ON HARRY
990 GET(1,1)=13,13,0L,G
990 GET(1,100)=13,100,0L,G
1000 REM MOVING H-MES GRAPHICS
1010 FOR A=1 TO50 STEP 2
1020 REM PUT TORPEDO ON SCREEN THEN BLANK IT OUT,REPEAT THIS TO CREATE MOVEMENT.
1030 PUT@A,100-R)=(R+12,100-R),TP,POST
1040 PUT@A,100-R)=(R+12,100-R),0L,POST
1050 NEXT A
1060 REM MOVING H-MES GRAPHICS
1070 FOR C=1 TO4 STEP 2
1080 PUT@C,100-R)=(R+12,100-R),0L,POST
1090 NEXT C
1100 REM ONE OF SHIPS LOST
1110 PRINT"ONE OF YOUR SHIPS HAS BEEN LOST ON THE PG="+ZD+1
1120 BRANCH TO DRAW NEXT CH-CLS
1130 REM SHIP MAY BE POSED DRAWING ON RANDOM NUMBERS
1140 C=INT(5000000):IF C=0 AND C=2 THEN 1100 ELSE RETURN

```

The Second 6809 COLOUR SHOW

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```

1150 PRINT"YOU WERE LUCKY, IT HAS BEEN FOUND" :GOTO 11 FOR C0=1 TO 2000:NEXT C0:CL
8:RETURN
1160 REM ANOTHER HAZARD:
1170 PRINT"THE CREW OF ONE OF YOUR SHIPS LOST THEIR NETS"
1180 PRINT"THEY REQUESTED HELP" :GOTO 11 FOR C0=1 TO 1
1190 FOR H0=1 TO 2000:NEXT H0
1200 CLS
1210 RETURN
1220 REM SET GRAPHICS MODE AND COLOUR SET
1230 PRINTCLS:SCREEN 1,0
1240 REM SECTION TO PRINT HI-RES GRID
1250 AQ=0
1260 AS=0 :AT=0
1270 FOR AP=30 TO 192 STEP 10
1280 FOR AT=40 TO 192 STEP 10
1290 AQ=AQ+1
1300 IF AS=0 THEN PRINTAP,AS,2,4 GOTO 1320
1310 INCAT:AS
1320 FOR BH=1 TO 1000:NEXT BH
1330 RETURN
1340 REM USER HAS REQUESTED TO SEE HI-RES GRID:DRAW HIM IT
1350 PRINTCLS:SCREEN 0
1360 IF TH0=0 THEN GOTO 1380
1370 GOTO 1400
1380 REM INSTRUCTIONS
1390 CL:PRINT"IN THIS GAME YOU,OUR BRAVE SEA CAPTAIN MUST DEFEAT YOUR ENEMY, C
THE FIERY DRAGON:2K VARIETY>> THIS WILL NOT BE EASY,IRONMAN HAZARDS ARISE!! YOU
,TO SHOOT YOUR ENEMY, A HAZARD-1-0000, THIS POINT YOU WILL SEE ON A HIGH-RES GRID"
1400 FOR H0=1 TO 2000:NEXT H0
1410 CLS:PRINT"YOU CAN SEE THE GRID BY TYPING 101 IN REPLY TO THE
"COMMANDER,WHERE DO YOU WISH TO FIRE SIX",PROMPT,HITTING ANY KEY WILL RETURN
1420 TO TEXT :GOTO 1360:REM
1430 FOR H0=1 TO 2000:NEXT H0
1440 RETURN

```

Dragon bulletins

WITH THE demise of Dragon Data, many Dragon computer owners feel very let down with many software companies abandoning the Dragon for more lucrative markets.

However, now you have a chance once again to put your humble Dragon to work and open up new horizons. On February 17 a new bulletin board went on-line. This bulletin board is operating in conjunction with REACT United Kingdom (a volunteer communications organisation) bulletin board. As well as providing information about REACT UK, and what local teams are doing in the community, there is also a section for Dragon computer owners.

If you are the owner of a Dragon 64, all that you will require is a telephone modem with a 300/300 baud operating rate, and some software to drive it. Owners of the Dragon 32 will also require an RS 232 interface. However, this need not cost you a fortune.

I have been trying out the communications packages supplied by Commodore Computers of 8 Middle Row, Clipping Norton, Devon, who can supply a complete communication package for the Dragon 32 for £149. Disk drive users can still use their drives as the RS 232 interface and CDS cartridge will work in tandem if you use a

mother board. Dragon 64 owners having an RS 232 interface built into their machines only require a modem and software which will cost about £115.

If it sounds like a lot of money to spend to access one Dragon bulletin board, bear in mind that once you have purchased your communications unit you will be able to enter the fascinating world of Micro Communications. If you have never experienced the joy of your home computer talking to, and being answered by, just machines I can assure you that it opens up a new world of exciting possibilities.

REACT, the new bulletin board, caters for Dragon computer owners who have sadly been neglected by most of the other bulletin boards. There will be facilities to leave messages for other Dragon users, to swap ideas and problems as the Noticboard section, and even send your unsaved bits and pieces. If the demand is there, it will also have facilities to upload and download free software. But, the most important thing about REACT is it is for Dragon users to communicate with other Dragon users to help and further the use and understanding of the Dragon computer — and its FREE.

REACT will be on line 24 hours a day, except for Saturday mornings between 9

am and 12 noon when the system will be updated. The system runs on a Dragon 64 with specially written software and several disk drives.

To access REACT first connect your modem and run the software — make sure the modem is set for 300/300 baud. Dial up REACT on 0376 218860. After one or two rings the auto answer modem will transmit a tone, then switch your modem on-line and replace the telephone receiver. You should then receive the opening page which will tell you that you are connected to REACT.

You will be asked to enter your name and password. Please enter your correct name as this will be used at a later date to let you know if there are any messages for you. As you will be a first time user, enter U to the prompt PASSWORD. You will then be asked if your computer will accept lower case letters; answer Y if yes, if not answer N. You will then be presented with a menu of options that you may access. You will not be able to use the Noticboard until you register as a user — this is to prevent abuse of this section. Registration is FREE and facilities are available on the bulletin board for you to register.

We want you to have fun using the bulletin board, but please remember that any bulletin board is only as good as the people who use it, so your contributions and comments are very important. ■

Brian Lloyd

Forth Protocol

Mark Varney explains how Forth is used as a language

FORTH is probably one of those least understood but most versatile and useful programming languages available today. Versions of FORTH seem to be available for almost every type of machine today — even including the new 32-bit processors. While end-users of the language (including both programmers and hardware design engineers alike) seem to endlessly extol its virtues, FORTH does not seem to have developed the following or popularity it deserves. This is unfortunate, especially to people like myself who seem to have been mistakenly labelled with the title of "software guru" because we dabble in a language which is neither primitive (machine code) nor high-level (eg Basic), and one computer jargon that is not in common use.

FORTH is, admittedly, not an easy language to understand at first glance. The immediate impression a newcomer to FORTH would get is that the language consists only of "words" — there are no line numbers — and that numbers have to be entered in before the operations. A program would, therefore, consist of several words all on one line, or on several, separated by blanks and contained either in a "dictionary" or within "screenfiles" (both convenient areas of RAM which can be saved in the same way as a Basic program listing). The difference between them is that the dictionary will hold words which can be used immediately by typing them in at the keyboard. Screenfiles, on the other hand, contain words which have to be loaded into the dictionary before they can be used.

An extremely useful feature of FORTH is that "words", which carry out different routines designed by the programmer, can be named anything you wish. This flexibility can be a valuable asset in aiding the "documentation" of a program — for

example, the following sequence of four FORTH words:

```
GET-DATA-VALUE  
TAKB SQUARE  
MULTIPLY-PI  
PRINT-VALUE
```

needs no explanation as to what happens to the DATA-VALUE. The use of English (in this case) means that programs can employ an application-specific vocabulary of words that will clearly be understood by the user.

Another useful feature is that this sequence of words can all be defined within yet another FORTH word so that only one word, eg AREA, need be typed in, instead of all four, in order to "execute" the routine. The sequence of defining words within words can go on *ad infinitum*, and it is this procedure that gives writing programs in FORTH the name "bottom-up" or "structured programming".

The process of building up routines and defining words in this way, and then entering them into the dictionary is known as "compilation". All high level languages

have a dictionary of sorts — you'll find one if you PEEK around the Basic ROM (from 40400 onwards) inside the Dragon, for example.

FORTH's dictionary begins in low memory, and expands up sequentially towards high memory, so, for example, AREA would be the last entry if no other words were defined afterwards. When it comes to "executing" the word AREA, FORTH will load an "instruction pointer" with the address of the last word in the dictionary and, if it corresponds to the word typed in, will start to run that routine. If the two words do not correspond then the last word in the dictionary will itself contain another pointer to the previous word before it in the dictionary (actually called a "link address"). If this does not fit then the next word is "linked" and tested, and so on until (in the case of a typing mistake) the whole dictionary would be searched from top to bottom.

Elementary routine

If the word definition is a very elementary routine — like adding two numbers together, or the LOOP instruction (similar to Basic's FOR...NEXT) — then the procedure used to carry it out is written immediately after the dictionary entry, and in machine code. The elementary words are termed "primitives", since you cannot do much else without them. Because the "primitives" are so useful they cannot usually be erased from the dictionary as can other words.

It is for these reasons that some people

High memory -->



Figure 1.

Schematic diagram of a FORTH word as seen in the dictionary. The words are divided into four "fields" holding either code or an address pointer. The code field address contains a pointer to executable machine code or to the parameter field. The address pointer for the vocabulary is held within the parameter field.

use FORTH alone — because of the linking nature between words, the language is fast (much faster than Basic) and for certain cases can be as fast as machine code if properly "tuned". That, indeed, should be sufficient incentive for anyone to learn FORTH who requires speed but does not wish to learn machine code assembly!

Words which access other pre-defined words or do not act on numbers alone will have a similar structure, but will branch off to other addresses in the dictionary and jump back again, using these routines exactly as subroutines. Actually, when it comes to examine FORTH words in more detail (which is not usually necessary), they contain more address codes which link the word to various other parts of memory (Figure 1). But it is this structure that "forces" FORTH to have a very low memory requirement, comparable to, and in many instances less than the equivalent assembler routines! For example, if a particular application were being developed (word processor, editor, debugger, etc) then the final program might be compressed into an area as little as 20Kbytes!

This makes FORTH an ideal language to have on small microcomputers where memory size is naturally at a premium. Where one might consider, eg, the writing of a routine for an EPROM loader or communications network too complex, it is actually an easy matter in FORTH (unless you know what to do). Even complex

subjects such as artificial intelligence programming, or digital signal processing, are easily implemented on the FORTH system.

FORTH is used extensively in my work in electrophysiology for the generation of signals applied to electrodes and the collection of data. Under most circumstances, FORTH is fast enough to deliver and capture signals at rates up to several hundreds, and even thousands, of Hertz. On the odd occasion when higher data sampling rates have been required, FORTH, again, has the facility to enable machine code to be used in place of FORTH words.

Assembler written in

So, instead of having to load up a separate assembler-editor to "code" a particular routine, and then have to deal with complicated LSR calls from within Basic, an assembler is written into the FORTH dictionary and the resultant machine code is used (just as another word would be). This is a perfectly natural process because FORTH is, itself, a series of machine coded routines that are "threaded" together through the use of links and calling addresses. My own philosophy has been to write everything in FORTH, and then, if a particular portion of a program needs speeding up (eg the graphics), then those rate-limiting steps would be re-coded in machine code. This is, in fact, probably the easiest way to learn machine code assembly language be-

cause FORTH is so close to it itself.

However, the major disadvantage is that FORTH relies heavily on the programmer to detect and correct mistakes. FORTH does not have all the extensive error checking facilities of Basic, so it does not automatically monitor (for instance) the "zero" condition when one number is divided by another, or the "over-range" condition on multiplication.

Indeed, the representation of numbers in general terms is poor: the 5800 Dragon versions of FORTH do not come with floating-point arithmetic. Mathematical routines have to be done in integer arithmetic — the variety of words for handling integers is actually much better than Basic. However, it is not difficult to write your own fixed- or floating-point software routines (Figure 2), and this is where I think much of the misunderstanding comes in.

FORTH has never had a "standard" in the same way as Basic has, and it probably never will because different people use it for different applications. Not everyone wants an extended arithmetic capability, and for them, it would only take up valuable memory that could be used for other purposes. The flexibility of FORTH has meant that there are no programming barriers — the ultimate performance is only limited by the ingenuity of the programmer. Sine, cosine, logarithms, etc, are quite easy to code yourself (Figure 3) since you have been shown how to do it.

The concept of the "stack" and handling of numbers is perhaps the hardest feature

Figure 2 FORTH definitions for some elementary fixed arithmetic expressions

```
SCR # 1
# # VARIABLE A1 # VARIABLE A2
1 # VARIABLE B1 # VARIABLE B2
2 : D= A1 / A2 / B1 / B2 /      ( DOUBLE PRECISION MULTIPLY )
3 B2 # A2 # V= B2 # A1 # D= D=V *
4 B1 # A2 # V= D=V * V
5 : FIX DPL # B1 IF S-D # DPL / ( FIXED-POINT FUNDAMENTAL DP )
6 THEN DPL # 4 SWAP DO DP, D= LOOP
7 : F= D= ;      ( FIXED-POINT ADDITION )
8 : F= -1 B+ D= ;      ( FIXED-POINT SUBTRACTION )
9 : F= D= SWP R= SWAP J=SWAP R=SWAP ( FIXED-POINT MULTIPLICATION )
10 B1 B2 # IF B1=V THEN ROT D=V
11 : F. SWAP OVER D=V C E E E E ( FIXED-POINT PRINT )
12 46 HOLD 42 SIGN 27 TYPE ;
13
14 ;S
15
```

The numbers first have to be converted into fixed point numbers by the FIX command which counts the number of digits to the right of the decimal place and traps out integers. If this were not done, the numbers would only be entered as double precision reals.

Examples of use:

```
0.01 FIX 5      FIX F= F.      0.0100 OK
10 FIX 0.02     FIX F= F.      0.2000 OK
-4.02 FIX -3.1416 FIX F= F.    0.4062 OK
3.1415 FIX 2.25  FIX F= F.      0.0145 OK
```

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Now software for review should be sent to Dragon
User, 13-13 Little Newport Street, London WC2H 7PP

Masterstroke 2

Program: Masterstroke 2
Features: Software, 35 Parker Street, Preston, Lancs. **Price:** £14.95

This NUMBER of utility packages appearing for the Dragon emphasises just how much of a programmer's machine it is. All the potential it has to accept new modifications to the original software, I only wonder why Dragon Data did not incorporate many of these ideas into their original BASIC interpreter.

Masterstroke 2 is a useful addition to any basic programmer's supply of commands. A number of the rather obvious omissions from the Dragon interpreter such as a MERGE command to merge BASIC program files; Autocopy of keys; Inversion of the screen display (green on black or orange on black are available); and full-error messages are included along with a host of other useful commands.

Also made available from BASIC are the Semgraphics mode described in Keith and Steven Blair's book *Advanced Sound and Graphics for the Dragon*. In this case they are called by BASIC. A number of special graphics commands are supported: GLINE, GDRAW and GSET are rather similar to the ordinary BASIC commands with similar names. It is also possible to have text mixed with the graphics.

Special commands are available for scrolling the screen contents in all four directions. Scrolling can be restricted to a part of the

screen as well. In addition, we also have a facility whereby the 10 number keys can be programmed as function keys when used with the right arrow pressed. These keys have already been given default values but it is also possible to redefine any of them for your own particular needs.

Program listing speed can also be changed, which normally needs a POKE to set unless you have Masterstroke installed. Another useful utility is a command to convert a Tandy Co-Co Basic program into Dragon Basic. Various other commands give more options on the appearance of the display as well as the ability to strip off all the REMs in a program automatically.

Just in case the advantages of the Semgraphics modes are not apparent to the user, they have supplied a program written to demonstrate this facility in use. This is another version of that old favourite of ancient Apple users, the little Block Out game, and it serves its purpose well.

All in all we have here a very useful utility package, produced at a very reasonable price of £19.95, with a well-written set of instructions. Once you have mastered the usual BASIC fairly well then you could well find this to be a worthwhile purchase. With the facilities it offers at the price it cannot but be very good value.

John ap Iwan



Money, money, money!

Program: Moneybox, Harris
Money: Software, 48 Alexandra Road, Hounslow, Middlesex TW3 4HP
Price: £14.95 (Disk)

On RUN(M) this program the display is converted into a 42 by 24 character on the graphics screen by a Machine Code routine, which is held on the disk and called upon running the main program. The display created is very good, and even includes the C sign.

Also incorporated is an auto-repeat for the keyboard. If anything, this is the most annoying part of the program because they have made the delay before a repeat is registered much too short. I have not been able to time the delay, but it seems to be less than a second.

With Moneybox it is possible to set each of the files (up to 99 separate ones) for a totally different purpose and account structure. Each file is

divided into 10 periods, and the day upon which each period starts can be defined by the user. Within each file there can be up to 80 accounts. Fully of these are already defined, but can be changed very easily, whilst 20 are left blank for any extra headings which may be required. The first 20 are identified as Sources of funds. The next 20 are sources of income.

Finally, account numbers 41 to 60 are for expenditures.

Moneybox can then manipulate the data on these files to keep your bookkeeping up to date, including VAT calculations if required. All receipts, payments, etc., are easily recorded and from these you can print out reports on to the screen or a printer, prepare budgets and make forecasts of just how much of an over-

draft you will have in a year's time!

It is designed to be used also by a small business as a simple cashbook accounting system. A comprehensive book of instructions comes with the disk, and needs to be read carefully before attempting to use the program. If anything, the only criticism I have of the program itself is that it takes quite an effort to learn how to use it.

Personally, I prefer the spreadsheet approach to this type of task, in that it is easier to follow, especially in asking "what-if" types of questions etc. Having said that, this still is quite a good package and would be very useful for anyone wishing to do such work.

John ap Iwan



Download

Program: Download, Microdeal, 45 Turo Road, St Austell, Cornwall **Price:** £7.95

AS WE have come to expect from Microdeal here is another quality arcade type game written in machine code. The general idea this time is that the little character which appears on the screen has to be controlled by means of a joystick and its button through a series of caverns.

On the way, he has to jump to grab various items or "Treasures" as well as collect a key to pass through doors. In places the hero has to climb ropes in order to negotiate some of the more difficult parts of the caverns. Controlling the jumping from the ropes is not easy even without the various horrible cavern-dwelling creatures such as poisonous ants and birds which seem to appear at random and frequent intervals.

At first, it is not that obvious how to control the little man. Specific points have to be reached on the ropes before jumping to a ledge. The jump itself must be made with the joystick in the correct position. All of this has to be learnt as you are playing the game. At first your three "lives" do not seem to last very long, but as you learn how to play the game and learn the necessary

skills you think you are getting on top, it brings out a few new surprises, just to make life interesting.

The sounds are quite good and the highest resolution graphics are used, which means that you have a choice between black, green or buff backgrounds. Having said that, the quality of the graphics are good and the time waiting, jumping and climbing man is quite realistic. I particularly like the bit where he is trying to climb through a closed door!

If you are into challenging games like this then this is a must!

John ap Iwan



The Dragon Roars

Plan D'Arcy shows how to make your Dragon talk back to you

A PROBLEM with using sound in BASIC on the Dragon is that it can be too pure and slow for many modern day sounds to be produced. What amazes me is that producing sound in machine code is unbelievably easy. As with graphics, the difficulty lies within ourselves — either you are good in ideas and design, or, like me, you struggle!

Rather than getting bogged down in a lot of detail first, as it is quite a short exercise, try the sample "SOUNDBOX" and I am sure that you will want to read on and begin constructing your own particular "box of sounds" to use in conjunction with your BASIC or machine code graphics programs.

Soundbox

Listing 1 — SOUNDBOX HEX DUMP

Following complimentary remarks from users of the HEX LOADER method accompanying my Disassembler article, I have retained that format.

Listing 2 — HEX LOADER (Basic)

This is the Disassembler Hex Loader Program with changes to just three lines (numbers 3,4,5,7) for those who have retained their copies. For readers who did not see or use it, please turn to Figure A for instructions.

Listing 3 — SOUND SELECTION

(Basic) A self explanatory sound menu program allowing you to call up and repeat sounds at the touch of a key (you couldn't type EXEC in fast enough for proper appreciation of some of the SOUNDBOX effects).

Using HEX LOADER, enter the "SOUNDBOX" machine code (Listing 1). Save the code (C:\ARC\B\B\SOUNDBOX). 28001,28002,28003). Enter and save the "SOUND SELECTOR" program. RUN the SOUND SELECTOR.

The machine code program that you have been using is position independent so will work if placed elsewhere in memory. It is structured so that, using an Assembler, simple amendments to the "SOUND ROUTINE TABLE" will enable you to add or delete specific sound routines, building up a composite library of sounds that can be instantly called from BASIC programs by a simple POKE and EXEC. With machine code being economical in memory, why not put all your sounds into one box, so to speak? Individual sound routines may be changed at any time and the re-assembly will automatically generate the correct current "SOUND ROUTINE TABLE" values for you.

The CONTROL ROUTINE switches on the sound source, executes the required sound routine according to the parameter

passed across (POKEd) by BASIC, switches off the sound source and returns to the BASIC program. I used DHEXAM with PCL-LEARN CLEAR2000, 10000. Source code (object code \$6001-\$6003).

If you commence machine code routines with a LONG BRANCH to the program entry point proper, as with this routine, the area immediately following the LBRN instruction may be used for passing information between BASIC and machine code (who says not to use EXEC because you can't pass parameters? I find this method far easier than USF). With this technique, to make how many changes you subsequently make to the machine code routine, you are unlikely to need to go back to the BASIC programs to amend the EXEC or POKE addresses. The method used to branch to the specific sound routines has many advantages:

- a) it generates position independent code (PIC) enabling SOUNDBOX to work regardless of eventual load position.
- b) there is no upper or lower limit on the number of SOUND ROUTINES supported by the program.
- c) maintenance is easy as should amendments cause actual start addresses of the individual routines to change, an Assembler automatically generates an up-to-date table of values.

Use of the PIA has probably been the most consistently contentious issue in Dragon User. Should anyone dispute what I have to say about it or sound, or my explanations, my only defence is that I am neither a scientist nor musician and this is how I understand things to work in my layman's terms — and work they do.

There are two means of producing sound from within the Dragon other than through the external sources of cassette and cartridge ports. One way is known as the "single bit sound signal" (that I have not yet found working) and the other, discussed here, is the very flexible and easy to use DAC (Digital to Analogue Converter).

Sound is produced by switching on the equipment that controls the DAC, the MULTIPLEXER CONTROL, LINES, and supplying a series of values 0-83 to the DAC itself. The actual sound made then depends on:

VOLUME	
or	
AMPLITUDE	of the
or	sound
COLORBASS	made
or	
STEREOTRY	
PICTA	
or	
FREQUENCY	of the
or	sound
DURATION	made
or	
PICTA (PICT)	
ORANGE	

***** SOUNDBOX (C) P.D'ARCY 1986 *****									

The **NOISE SUBROUTINE** makes **SOUND** in Register A with **PITCH** in Register B. Pitch is needed quite often, but not always, which is why **SOUND** is supplied as a separate routine. The **NOISE** routine simply calls both **SOUND** and **PITCH** subroutines. Source (object code \$B0BC-\$B0DC):

```

** noise sound (pitch with an inch bit)
$B0BC: 0000 000000
        0001 011000
        0010

```

Having put these sounds together, even I cannot understand why they actually sound as they do. Apparently, a lot of it is to do with the ear making what it can of the air waves sent to it — the air waves being altered by the values written to the DAC (which causes changes in its voltage) and the rate at which the values are written. I suggest that if your understanding of sound is as non-existent as mine, you, too, simply experiment with values until you come up with something that sounds right to you.

My version of **LASER ZAP** is created by repeating the same loudness of noise by writing a pair of values alternately (in this instance, the loudest possible, \$5 then 0) but increasing the duration from 1 (\$D4) to 17 (\$DCE) between the repetitions, thus smoothly lowering the pitch. I and the sound when the duration count reaches \$D0 (\$D4F+\$D00). Experimented yourself with loudness and pitch and you may find a ZAP that you like better. Source (object code \$B0DC-\$B0E0):

```

*****
***** $B0DC: LASER *****
*****
LASER: LDA #0
LASEPL: LSR #0
        0000 001000
        0001 001000
        0010 001000
        0011 001000
        0100 001000
        0101 001000
        0110 001000
        0111 001000
        1000 001000
        1001 001000
        1010 001000
        1011 001000
        1100 001000
        1101 001000
        1110 001000
        1111 001000

```

I don't know the official definitions of laser zap or phaser noises, but to me, sounds that I have heard described as phasers seem simply to be more or less a repetitive, whiplike type of zap. For fuller appreciation, the routine repeats the sound cycle five times (\$D5 #5). You may like to vary this value.

My version of a phaser runs through a cycle of gradually reducing volume levels, starting at the maximum (PHASER LDA #63), decreasing by 1 (\$D0 \$D0/\$D0F) until a starting level of zero is arrived at. Duration (=pitch) is not used. Instead, after writing the starting volume to the DAC, that individual sound is modified by writing a further series of values to the DAC, the series being the start volume level (PHASER LDA SOUND) reduced by 1 (\$D0A) until it reaches zero. Different types of phasers can be achieved (fast/slow/foul) by varying values. Source (object code \$B0E4-\$B0F0): (Figure 5)

Explosions tend to sound ragged, or crackly, to the ear and they tend to fade away over the duration. You could set up

Fig. 5
USING THE HES LOADER PROGRAM (HERLOADER) Listing 5. The program makes in typically fast accurate entry of machine code data by use of a CHECKSUM after every 10 bytes. It also contains an EDIT facility so that a whole line of data doesn't need to be re-entered because of an odd typing slip. Any amount of data may be entered at one session, allowing you to pick up and put down programme data as suits your mood or convenience. Type in the program and save it. RUN.

Input the starting address for the code to be entered — (\$B0F) or the next point if continuing from a previous session. Input each line of the hex dump (listing 1) as a stream of 30 consecutive hex characters (\$B0A-F). The space character separates each set of ten characters (=1 byte) is for easier reading and checking and is not to be typed in.

After entering the last pair of characters in a line, the checksum is types in and =ENTER= pressed. If the data entered agrees with the checksum, the value is POKED into the designated memory locations and the screen prompts the next address. Pressing =CLEAR= at any time abandons any current line being entered and returns you to the START ADDRESS screen. Enter an address of zero to terminate the program.

Should the checksum check fail, EDIT mode is entered, allowing you to use the left and right arrow keys to position the editor's up arrow marker below any offending characters and to overwrite them with correct values. =B= instantly positions you at the checksum value should that be where the error lies. When editing is complete, press =ENTER= for the line to be rechecked again, etc.

At any time that you wish to cease program data entry, mark being 1 to indicate the next point. Save the code (SAVEM \$B0F0) (\$B0F0, \$B0C0, \$B0D0). (Simply speaking, you need only to save the

data entered so far, but always using the first \$SAVEM command helps avoid overwriting errors.

When you wish to continue program data entry, reserve machine code memory (\$B0A0-\$B0B0). \$CLEARM the last saved checksum program data file. \$LOADM the \$B0A0 hex loader program. RUN and input the marked next point at the start address, etc.

Once the program data is fully entered, as a further precaution, particularly if loaded over more than one session, check the overall checksum by exiting from the hex loader and type in (\$B0A0)=ENTER=. This will tot up the values in locations \$B0C0-\$B0D0 inclusive and display the total. The overall checksum is \$B405. If it does not agree, HESM will proceed to tot up and display each line's checksum total in five places. Once you spot a discrepancy, use =B= to =B= the hex loader program (press any other key to continue the tot up process).

Once a clean bill of health is confirmed, save the program. \$SAVEM "SOUND\$B0C0" (\$B0C0, \$B0D0, \$B0E0)

Hex loader adjustments

Adjust the hex loader \$CLEAR (\$B0C) and checking (save address) (\$B0D4) if you wish to set up the program data at a lower address (you can always adjust its final loading position by \$LOADM with offset and \$SAVEM from that point once the program has been entered).

HERLOADER may be of use for other similarly set up hex dumps — but they may not be 10 bytes per checksum. Adjust \$B010 (initial) as appropriate — the program will cope with a maximum of 13 bytes per line without needing further amendment. Should the checksum value be given in hex (this dump has a decimal value), it can be entered using the standard BASIC facility (as can starting addresses presented in hex) of prefixing it with \$H.

I have started from ROM address \$B000 (\$B0A0 LDA #B0A0), given each sound a duration of 30 (\$D0 #00), continuing until address \$C000 (\$B0F0 #E000) is reached. You may well realize that the potential maximum volume contained in a byte is 255, so the maximum volume of 63 may be exceeded. The \$SOUND routine loops off the two most significant bits of the value entered to 1 in Register A, when it repositions bits 0-5 to bits 2-7 for the DAC byte, so a maximum value of 63 is still written. This may be used to good effect deliberately in creating sounds by running through a series that exceeds 63 (after 63, the next value will be 0 acc). Source (object \$B0F4-\$B100):

```

*****
***** $B100: EXPLO *****
*****
EXPLO: LDA #B0F4
EXPLO: LDA #30
        0000 001000
        0001 001000
        0010 001000
        0011 001000
        0100 001000
        0101 001000
        0110 001000
        0111 001000
        1000 001000
        1001 001000
        1010 001000
        1011 001000
        1100 001000
        1101 001000
        1110 001000
        1111 001000

```

The fade of an explosion is known as "noise decay". What we need to do is to ensure that the maximum volume is at any one time (is in line with the delay required, for a fast to start, then gradual or whatever).

```

*****
***** $B100: PHASER *****
*****
PHASER: LDA #0
PHASER: LSR #0
PHASER: LDA #63
        0000 001000
        0001 001000
        0010 001000
        0011 001000
        0100 001000
        0101 001000
        0110 001000
        0111 001000
        1000 001000
        1001 001000
        1010 001000
        1011 001000
        1100 001000
        1101 001000
        1110 001000
        1111 001000

```

Figure 5

your own crackly sound value sequence that decreases in volume as it progresses, but a popular idea is that of using a chunk of fairly random values (in the Dragon memory — and where better to find it) made of readily available assorted values than program implications — notably, the BASIC INTERPRETER (BASIC) which is always there?

The following program — BASIC NOISE — will give a noise akin to the sheet of crackly sound heard when moving a TV or radio tuner between stations. This is known as "white noise". The sound generated by the BASIC NOISE, for all practical purposes, can be termed "white noise", although the purists will disagree. It is an excellent basis for explosions.

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Heartbeat

From Vince Ginepro in Northumberland
THIS PROGRAM simulates those heart rate testing machines which are beginning to appear in a variety of shops around the country.

Library	When	URL	Access	Notes
...

amusement only and not a serious application. The program is calibrated for the average adult's heart rate and it should be noted that children's hearts beat faster than an adult's.

```

5  STARTBAT (<C> V. SLEIGHLL OCT 1988
10  J#=CHRR(128)
20  J#=-J#-J#
30  J#=-J#-J#-J#-J#
40  FOR A=1 TO 5
50  CLSO
60  PRINT#105,"hear hear"1000000,2
70  FOR Q=1 TO 500:NEXT
80  CLSO
90  FORB=1 TO 500:NEXT
100 NEXT A
110 PRINT#220,"want J# instructions?"
120 Q#=[RETRN]:IF Q#="" GOTO 130
130 IF Q#="Y" GOTO 140ELSE 360
140 CLSO
150 PRINT#135,"see J# hear J# testify J# press J# lie J# space J# bar J# again?"
160 Q#=[RETRN]:IF Q#=[CHRR(32)] THEN 360 ELSE 170
170 D=TIMER/500000000:FO,2
180 C=INT(128*2*2*2*2*2)
190 PRINT#262,C
200 IF C<=0 THEN PRINT# 200,"calculate"s:GOTO 250
210 IF C<63 AND C<70 THEN PRINT#200,"see1 J# conditioned"s:GOTO 250
220 IF C<71 AND C<85 THEN PRINT#200,"average"s:GOTO 250
230 IF C<86 AND C<100 THEN PRINT#200,"below J# average"s
240 IF C<100 THEN PRINT#300,"may J# read J# exercise?"
250 FOR X=1 TO 200:NEXT X
260 PRINT#420,"want J# another J# go?"
270 Q#=[RETRN]:IF Q#="Y" THEN 410 ELSE 290
280 IF Q#="N" THEN 270 ELSE ENB
290 IF Q#="" GOTO 230
300 CLSO
310 PRINT#2,"like J# program J# calculates J# your J#?"
320 PRINT#20,"heartrate"
330 PRINT#98,"used J# properly" J# it J# can J# indicate J# how J# it J# yes J#
   "are"
340 PRINT#374,"test J# reason J# your J# heartrate J# can J# alter J# drama-
   tically J# alter J# exercise J# for J# at J#
350 PRINT "like J# at J# stress J#
360 PRINT#232,"like J# your J# pulse J# and J# leave J# your J# longer J# tra-
   ce J#

```

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Continued from page 28

```
370 PRINT "then";38"press";39"the";39"spacebar";39"and";39"start";39"counting";39"Use";39"beats";
380 G4=INKEY$(IF G4<=CHR$(32) THEN 380
390 TIME=TIME-SOUND(50,2
400 GOTO 140
410 CLS:GOTO380
```

Conversion

From P Howarth in Manchester

CONVERSION is a simple program to convert various measurements of one item into its equivalent number in another.

This program will convert inches to

centimetres, feet to metres, miles to kilometres, gallons to litres, ounces to grammes, pounds to kilograms and Fahrenheit to centigrade.

```
10 REM***** P. HOWARTH *****
20 CLS
30 PRINT"WHICH CONVERSION DO YOU R
EQUIRE?";
40 PRINT
50 PRINT"(1) INCHES - CENTIMETRES
"
60 PRINT"(2) CENTIMETRES - INCHES
"
70 PRINT"(3) FEET - METRES"
80 PRINT"(4) METRES - FEET"
90 PRINT"(5) MILES - KILOMETRES"
100 PRINT"(6) KILOMETRES - MILES"
110 PRINT"(7) GALLONS - LITRES"
120 PRINT"(8) LITRES - GALLONS"
130 PRINT"(9) OUNCES - GRAMMES"
140 PRINT"(10) GRAMMES - OUNCES"
150 PRINT"(11) POUNDS - KILOGRAMS"
160 PRINT"(12) KILOGRAMS - POUNDS"
170 PRINT"(13) FAHRENHEIT - CENTIG
RADE"
180 INPUT A
190 IF A<1 OR A>13 THEN GOTO 180
200 ON A GOSUB 260,340,420,500,575
,650,730,810,890,970,1050,1130,121
0
210 PRINT#445,"ANOTHER CONVERSION
TY/NO?";
220 A$=INKEY$
230 IF A$="" THEN GOTO 220
240 IF A$="Y" THEN GOTO 20
250 CLS:STOP
260 CLS
270 PRINT#445,"INPUT INCHES ";
280 INPUT IN
290 LET CM=IN * 2.54
300 PRINT#197,"IN;" * 2.54 = ";CM
310 PRINT#230,"CM = ";CM
320 FOR X=0 TO 15000:NEXT X
330 RETURN
340 CLS
350 PRINT#445,"INPUT CENTIMETRES "
;
360 INPUT CM
```

```
370 LET IN=CM / 2.54
380 PRINT#197,"CM;" / 2.54 = ";IN
390 PRINT#230,"IN = ";IN
400 FOR X=0 TO 15000:NEXT X
410 RETURN
420 CLS
430 PRINT#445,"INPUT FEET ";
440 INPUT F
450 LET M=F * 0.3048
460 PRINT#197,"F;" * 0.3048 = ";M
470 PRINT#230,"M = ";M
480 FOR X=0 TO 15000:NEXT X
490 RETURN
500 CLS
500 CLS
510 PRINT#445,"INPUT METRES ";
520 INPUT M
530 LET F=M / 0.3048
540 PRINT#197,"M;" / 0.3048 = ";F
550 PRINT#230,"FT = ";F
560 FOR X=0 TO 15000:NEXT X
570 RETURN
575 CLS
580 PRINT#445,"INPUT MILES ";
590 INPUT ML
600 LET KM=ML * 1.6093
610 PRINT#197,"ML;" * 1.6093 = ";KM
620 PRINT#230,"KM = ";KM
630 FOR X=0 TO 15000:NEXT X
640 RETURN
650 CLS
660 PRINT#445,"INPUT KILOMETRES ";
670 INPUT KM
680 LET ML=KM / 1.6093
690 PRINT#197,"KM;" / 1.6093 = ";ML
700 PRINT#230,"ML = ";ML
710 FOR X=0 TO 15000:NEXT X
720 RETURN
730 CLS
740 PRINT#445,"INPUT GALLONS ";
750 INPUT GAL
760 LET LIT=GAL * 3.7854
770 PRINT#197,"GAL;" * 3.7854 = ";L
IT
```

Continued on page 30

Continued from page 31

```

780 PRINT#230,"LITRE = ";LIT
790 FOR X=0 TO 15000:NEXT X
800 RETURN
810 CLS
820 PRINT#166,"INPUT LITRES ";
830 INPUT LIT
840 LET GAL=LIT / 3.7854
850 PRINT#197,LIT;" / 3.7854 = ";G
AL
860 PRINT#230,"GAL = ";GAL
870 FOR X=0 TO 15000:NEXT X
880 RETURN
890 CLS
900 PRINT#166,"INPUT OUNCES ";
910 INPUT OZ
920 LET G=OZ * 28.35
930 PRINT#197,OZ;" * 28.35 = ";G
940 PRINT#230,"GRAMMES = ";G
950 FOR X=0 TO 15000:NEXT X
960 RETURN
970 CLS
980 PRINT#166,"INPUT GRAMMES ";
990 INPUT G
1000 LET OZ=G / 28.35
1010 PRINT#197,G;" / 28.35 = ";OZ
1020 PRINT#230,"OUNCES = ";OZ
1030 FOR X=0 TO 15000:NEXT X
1040 RETURN

1050 CLS
1060 PRINT#166,"INPUT POUNDS ";
1070 INPUT LB
1080 LET KG=LB * 0.4536
1090 PRINT#197,LB;" * 0.4536 = ";K
G
1100 PRINT#230,"KG = ";KG
1110 FOR X=0 TO 15000:NEXT X
1120 RETURN
1130 CLS
1140 PRINT#166,"INPUT KILOGRAMS ";
1150 INPUT KG
1160 LET LB=KG / 0.4536
1170 PRINT#197,KG;" / 0.4536 = ";L
B
1180 PRINT#230,"POUNDS = ";LB
1190 FOR X=0 TO 15000:NEXT X
1200 RETURN
1210 CLS
1220 PRINT#166,"INPUT FAHRENHEIT ";
F
1230 INPUT FA
1240 LET CE=(FA-32)*(5/9)
1250 PRINT#197,"( ";FA;" -32)*(5/9)
= ";CE
1260 PRINT#230,"CENTIGRADE = ";CE
1270 FOR X=0 TO 15000:NEXT X
1280 RETURN

```

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Abstract

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I'LL BEGIN with a grumbling apology to reader Rosalind Redwood of Bristol, who I mentioned in the January issue as having problems with *Castro Island* — she couldn't get the treasure back because the transporter disappeared when she'd bartered with Trader Jack for the keys. I dared to suggest that maybe Rosalind hadn't found the treasure after all, but some jewelry that appears earlier in the game, basing this on the fact that you need the machete from Trader Jack to find the treasure, not the keys.

In fact, Rosalind had already done that, but found, as did other readers, that a second time caused the transporter device to disappear. So, how do you get round it? Well, it seems to depend on the order in which you trade. If you find the treasure, then attempt to trade for the keys, the device goes. If you get the keys, return to open the desk and read the notes, then go back for the machete and continue to find the treasure, the device will still be there. Sorry for the stir on your status as an adventurer, Rosalind.

A letter this month from Kerry O'Sullivan, with no address but containing the proud announcement that after twelve months' hard labour, Kerry too has completed *Castro Island*, having had trouble with the professor's notes. John Martin has sorted out *Castro Island* and polished off *Black Sanctuary*, finding the letter rather disappointing, but he's now stuck in *Madness and the Minotaur*. John's problem is finding the oil for the lamp. So, if you can spare clues, or even some oil, write to John at 114 Blackwood, Outon Mulcume, Peterborough, Cambs. John's also finished *El Diablo*, "after a lot of frustration and dead cows," he says, so maybe you can swap tips with him.

Another reader in need of help is Pauline Hampton of 18 Cherry Lane, Lawton Heath, Nanger, Stoke-on-Trent ST17 3JZ. Pauline is one treasure short in *Keys of the Wizard*, and not even Microsoft can help her. She doesn't say which treasure she's found, but if anyone can help do write to her. In return Pauline can help with the dreaded *El Diablo* and *Castro Island* and says she can recommend Channel 5's *One Minute*.

I'm afraid I can't recommend Channel 5's *Circus* as highly as some of the others in the *Mysterious Adventure* series. I haven't

had time or space to look at them all yet, but I loaded up *Circus* the other evening to see what it was about. The following evening I finished it, without the aid of a safety net. In fact that's revealing, you do need the aid of a safety net, and a few SAVEs here and there, but with only about 33 locations it's not the hardest adventure you'll ever have to tackle.

The story is that your car has run out of petrol on a lonely country road ... dear me, the mishaps that happen to us innocent adventurers. As you go trudging over the fields and roads you come across a circus tent ... but is it real or haunted?



And where's the light that enables you to see inside? There's a cage containing a sleeping tiger, and a tank containing a seal, so with just these two creatures and a solitary mouse is it any wonder the circus closed down? Take care going up to the towers and the lightings, and once you've found a source of light you shouldn't hang about as its life is limited.

The adventure sets you two main problems. One is in finding just the right words to solve a particular problem, and this to my mind is not what adventures are about. You know what you want to do, but what are the exact words the program's looking for. In *Circus* there's a chest which you know you must have to open, but after OPEN CHEST, HIT CHEST, BASH CHEST, and a dozen other attempts I was about to give up. When I eventually discovered what you had to do I could have kicked the programmer.

The other problem *Circus* sets is that you only have a certain number of moves before your light runs out, and also a

certain number when you get into the end sequence, so you must work out the most economical way of moving things around and solving problems. When I did it I was on my very last turn as I issued, with fingers crossed, what I hoped was the final command. By the aim of my tenth turn, I did it, but I hoped for more than a few hours of entertainment from a £8.95 adventure. Fortunately, not all Channel 5's are so simple, and I did have a letter recently from a reader who enjoyed *Circus* a great deal, so make your own minds up about that.

Maybe I'm just in a grumpy mood this month, because I don't like the other adventure much either! This was *Terror Castle* from Gnomon Software, whose title *The Shrunken Scientist* impressed me last time. When I loaded up this one though it looked rather familiar, and sure enough it was an adventure that had been polished and then withdrawn last year under the title *Horror Castle*. Your objective is to rescue a beautiful princess from said castle, so I don't know whether this will appeal to the many female adventurers I get letters from (it's the only reason I write the column).

What doesn't appeal to anyone is the lack of a SAVE feature, particularly as the game takes a delight in killing you off without warning. This doesn't matter too much early on, but when you're well into the adventure you don't want to discover that you've stepped through a door and fallen 100 feet into the mud so you have to start again. The location descriptions are very brief, with no atmosphere at all — well, how can you have atmosphere when you fly in this drearily old castle a table which has a drawer requiring a combination to unlock it? The combination is on a card elsewhere, and it's typical of the lack of logic that you can't read the card in any location other than the one where the table is. Why on earth not?

I had been hoping to include reviews of the two new ones from *Adventure International*, *Spiderman* and *The Sorcerer of Claymore* Castle, but the review copies haven't arrived. They'll be here next month, though. If I have to trek to Birmingham cap in hand. Goodness, I might even buy them. Don't tell the editor, though, or I'll be drummed out of the *Revelation* Union. ■

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1992

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Human

Abstract

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Four Dragon 64s to be won

CAN YOU FIND the two whole numbers which, when multiplied together will come to exactly 1,000,000? Easy? How about

two squares. By taking 21 rectangles of card, each 2 x 1 inches in size, is it possible to completely cover these remain-

ing squares with the cards? The grid to have alternate squares shaded like a chessboard. If this is done the two missing squares will be both of the same colour, either white or black. Now a 2 x 1 card can only cover one square of each colour however it is placed, and once thirty of them have been positioned, the two uncovered squares will be of the same colour, and so cannot both be covered by the remaining card.

Now let's return to our original problem. We have seen how two factors of 10^6 can be found, neither containing any zeros. Are there any other powers of ten that can be similarly expressed? Ten itself has factors of 2 and 5, and one-hundred has factors of 4 and 25. In each case these factors are found by simply raising 2 and 5 to the corresponding power to which we have raised the 10. The results are shown as follows:

$10^2 = 2^2$ times 5^2 times	5
$10^3 = 2^3$ times 5^3 times	125
$10^4 = 2^4$ times 5^4 times	100
$10^5 = 2^5$ times 5^5 times	3125
$10^6 = 2^6$ times 5^6 times	15625
$10^7 = 2^7$ times 5^7 times	78125

Unfortunately 10^6 is equal to 390625, which, as it contains a zero, is not admissible, and so 10^6 cannot be so factored.

This month's competition is to determine how many other powers to ten have two factors which do not contain zeros.

As a hint, and to save any sleepless nights, it has been established by a computer in America that all powers of 2 from 2^{10} to 2^{1000} contain at least one zero, so we need only concern ourselves here with powers up to 100.



adding the stipulation that neither number must contain any zeros. This makes things a bit harder — or even, you may think, impossible. That is unless you happen to hit upon a novel method of approach whereupon the solution becomes simplicity itself.

One million is equivalent to 10^6 raised to the sixth power — that is 10^6 . Now, 10, as well as having factors of 10 and 1, also has factors of 2 and 5. So, just as 10^6 equals one million so too does $2^6 \times 5^6$, that can also be written as $2^6 \times 5^6$ which works out as 64 times 15,625. Thus we arrive at our answer to two factors of one million, neither containing any zeros.

Puzzles of this type in which the solution is readily apparent but only if you hit upon such a lateral method have become known by the not inappropriate name of 'aha' problems. It was for much the same reason that the concealed sunken fences, popular with landscape gardeners such as Capability Brown and his contemporaries, were called 'ha-ha's' mainly due to the expression of surprise when encountered for the first time.

Here is another 'aha' of the mathematical kind. Draw an eight-inch square, and rule it up into a grid of sixty-four one-inch squares. Now cross out two diagonally opposite-corner squares, so leaving sixty-

ing squares with the cards?

If you were to try to solve this by actual experiment, you might find that your first few attempts failed. By the time that you had had a couple of dozen tries — also equally fruitless — you might reasonably suppose that the solution was difficult if not impossible. But how can it be proved? Of the millions of different ways in which the cards can be placed is there not one that will succeed in covering all the squares?

The answer is that it is impossible, and the solution is beautifully simple. Consider

Prize

THIS ISSUE Competition is giving away four Dragon 64s to four lucky winners of this competition.

Rules

TO WIN a Dragon 64 you must both show the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. Please do not send in a cassette containing the answer. As a chessboard complete the following sentence in 18 words or less. "I would like to own a 64 because..."

Your entry must arrive at Dragon User by the last working day of April. The

winners and the solution to the puzzle will be published in our July issue. Entries will not be acknowledged and we cannot enter into correspondence on the result.

January winner

THE CENTRE of the disk should be 2.625000 inches apart (approximately). The 10 winners, who will each receive six games from Coda Software, are: A. Clark of Warral, Kevin Desmond of Carlisle, Boris Ledebur of Krefeld, Jason Perry of Wales, Gordon French of Northampton, J. Meyer of Woking, J. Jobby at Devon, Dominic Brodbeck of Tarkenton, J. Proust of Belgium and C. Davis of Preston.

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